a) providing a sample comprising at least one strand of nucleic acid and its complementary strand, said sample capable of forming at least one double stranded section[s] of greater than 50 nucleotide subunits, wherein [one of said at least one strand of said nucleic acid and its complementary strand] said double stranded section is suspected to include said [selected] target sequence;

b) mixing said sample with a PNA probe labeled with a detectable moiety, said PNA probe having a sequence complementary to at least a portion of said [selected] target sequence, [said mixing occurring in the presence of at least one nucleic acid/nucleic acid denaturing reagent permitting the formation of a PNA probe/nucleic acid complex when said selected target sequence is present];

c) separating a [said] PNA probe/nucleic acid complex from other components of the mixture resulting from step b) when said target sequence is present, said separating step beginning in the presence of a medium denaturing to said double stranded section, to produce a separated PNA probe/nucleic acid complex; and

d) detecting said separated PNA probe/nucleic acid complex.

34. (Amended) The method of claim 32 wherein said denaturing medium comprises a denaturing reagent [is] selected from the group consisting of urea, and formamide[, and organic solvents].

35. (Amended) The method of claim 32 wherein said denaturing medium [reagent] comprises [a low ionic strength buffer that permits adjustment of the mixture resulting from step b) to low] salt concentrations of less than 50 mM.

36. (Amended) The method of claim 32 further comprises the step of adjusting the temperature of the mixture resulting from step b) from a temperature of about 95° - 65° C to a temperature of about 60° - 30° C.

37. (Amended) The method of claim 32 wherein the detectable moiety is selected from the group consisting of enzymes, colored particles, fluorophores, biotin, [chromophores,] radioisotopes, electrochemicals and chemiluminescent moieties.

46. (Amended) An apparatus comprising:

a) a sample introduction zone;

b) at least one PNA probe labeled with a detectable moiety selected from the group consisting of enzymes, colored particles, fluorophores, biotin, radioisotopes, electrochemicals and chemiluminescent moieties, wherein said PNA probe is disposed [to mix] upstream of a separation zone [with a sample introduced in said introduction zone, said sample comprising at least one double stranded polynucleotide, said at least one PNA probe having a sequence complementary to a selected nucleotide target sequence suspected to be present in said at least one double stranded polynucleotide]; and

c) [a nucleic acid/nucleic acid denaturing reagent permitting the formation of a PNA probe/nucleic acid complex when said selected target sequence is present; and

d) ] said separation zone in communication with said sample introduction zone[, said separation zone separating said PNA probe/nucleic acid complexes from other components present in said introduction zone and said separation zone].

54. (Amended) [The] An apparatus [of claim 46 wherein at least one of said at least] comprising:

a) a sample introduction zone;

b) at least one PNA probe [is] associated with a particle; and

c) a separation zone in communication with said introduction zone.

55. (Amended) The apparatus of claim 46 [wherein at least one of said] further comprising at least one PNA probe [comprises] labeled with a charge-modifying moiety.

In claim 58, in step e), after the word "with" delete the preposition "to".

68. (New) The microchip apparatus of claim 58 further comprising an electric power supply coupled to the microchip apparatus.

69. (New) The microchip apparatus of claim 68 wherein at least said sample introduction zone is in electrical connection with a high voltage and said detection zone is in electrical connection with each capillary channel on ground.

70. (New) The microchip apparatus of claim 58 wherein the microchip is coupled to a laser-induced-fluorescence detection system.

71. (New) A microchip apparatus comprising a plurality of capillary channels, wherein each of said capillary channels further comprises:

a) a sample introduction zone;

b) at least one PNA probe labeled with a detectable moiety, said PNA probe disposed upstream of a separation zone; and

c) a detection zone; wherein said separation zone is in communication with said introduction zone and said detection zone.

72. (New) A method for detecting a target sequence in a polynucleotide, said method comprising the steps of:

a) providing a sample comprising a strand of nucleic acid and its complementary strand, said sample capable of forming at least one double stranded section of greater than 50 nucleotide subunits, wherein said doubled stranded section is suspected to include said target sequence;

b) mixing said sample with a PNA probe, said PNA probe having a sequence of 4 to 15 nucleotide subunits and being complementary to a portion of said target sequence to form a PNA probe/nucleic acid complex when said target sequence is present;

c) separating said PNA probe/nucleic acid complex from other components of the mixture resulting from step b) to produce a separated PNA probe/nucleic acid complex; and

d) detecting said separated PNA probe/nucleic acid complex.

73. (New) A method for detecting a target sequence in a polynucleotide, said method comprising the steps of:

a) providing a sample comprising a strand of nucleic acid and its complementary strand, wherein said sample is suspected to include said target sequence;

b) mixing said sample with a PNA probe, said PNA probe having a sequence complementary to at least a portion of said target sequence,

c) separating a PNA probe/nucleic acid complex from other components of the mixture resulting from step b), said separating beginning in the presence of at least one nucleic acid/nucleic acid denaturing medium selected from the group consisting of urea, formamide, and salt having a concentration of less than 50 mM, to produce a separated PNA probe/nucleic acid complex when said target sequence is present; and

d) detecting said separated PNA probe/nucleic acid complex.

74. (New) A method for detecting a target sequence in a polynucleotide, said method comprising the steps of:

a) providing a sample comprising a strand of nucleic acid and its complementary strand, wherein said sample is suspected to include said target sequence;